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ABSTRACT

In order to optimize the use of available bibliographic data in machine-readable form by Canadian Libraries, the National Library of Canada is developing new automated systems. Implementation priorities are related to the development of national and international standards, systems, and networks. One major project is the design of a system, using MARC (Machine-Readable Cataloging) formats, for cataloging and for compiling "Canadiana," the national bibliography. Development of Canadian MARC tapes is another major project. A third project will be the establishment and coordination of an automated Canadian union catalog system. (PF)

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AUTOMATED SYSTEMS AT THE NATIONAL LIBRARY: PAST, PRESENT AND FUTURE

I. Introduction and Background of Automated Systems at the National Library

The first efforts at automating library applications at the National Library, begun in 1968, consisted of the use of electronic data processing for the production of the index to *Canadiana*. This was undertaken after a careful consideration of the merits of automation which showed that an automated system would be more efficient and faster than the manual methods to process the large number of index entries. In order to proceed in a logical manner and to avoid the danger of developing a number of individual systems which might not fit together into a total system, the National Librarian decided that a complete feasibility study of all National Library operations should be carried out to determine the areas in which automated procedures could beneficially be applied. The Systems Development Project Team presented its report in 1970 and recommended an integrated information system for the National Library comprising five major subsystems: Acquisitions, Cataloguing including *Canadiana*, Union Catalogue, Union List of Serials and Serials Control.

Although the most obvious place to begin implementation was with Acquisitions, where material first enters the library and where bibliographic records are created, it was decided to continue the development of a complete system for *Canadiana*, as this is an essential service for Canadian libraries and thus should be given priority over National Library internal housekeeping operations. At the same time the National Librarian appointed a series of three task groups to establish standards and provide advice and recommendations on the National Library's major bibliographic services. The first, the Canadian Task Group on Cataloguing Standards, advised on standards for the creation of bibliographic records in both official languages. The second, the Canadian MARC Task Group, provided specifications for the development of a Canadian MARC (MAchine-Readable Cataloguing) format as a vehicle for the exchange of bibliographic records among libraries. The third, the Canadian Union Catalogue Task Group is now studying a national bibliographic data base which will be able to utilize machine-readable records from many sources.

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II. Identification, Planning and Scheduling of Automation Projects at the National Library

The automation of library operations is very complex and therefore very time-consuming and expensive. The application of computers to scientific and business operations usually involves numerical data and mathematical manipulations. This is exactly what computers were first designed to do and they are still most easily programmed for this type of computation. Library operations involve large amounts of alphabetical data both bibliographic and textual. There is a need for extended character sets with diacritical marks for all languages, mathematical and scientific symbols and characters from a number of alphabets. The amount of data which must be fed into the computer and stored in magnetic form is very large and thus storage for a system which provides immediate access is very expensive. Librarians with knowledge of computers and systems analysists and programmers with knowledge of libraries are still in very short supply and the competition among libraries for their services is great. Both are necessary for the successful implementation of library systems.

In the past few years, the automation of library services in Canada and in other countries has accelerated greatly and it is now essential at least for large libraries to have computer systems which can both create bibliographic data in machine-readable form and utilize such data produced elsewhere which is available through various tape services. Failure of any major library to keep pace in automated development can mean being cut off from national and international systems and data exchange.

The factors which influence the assignment of priorities to the automation of National Library services change according to internal and external pressures and developments. The number of operations at the National Library which must eventually be automated is so great that we cannot undertake them all at once; we must choose those which are most important in order to tie in with outside developments and networks and to provide essential services to the Canadian library community. An automation schedule must be realistic; the National Library has a very small systems development staff in relation to the number of projects to be carried out. It is difficult for us to compete with university libraries for highly qualified systems people, because we are not free to bargain on salaries and other benefits because of government regulations concerning staffing and job classification. Bilingual training further affects productivity. The Research and Planning Branch develops systems for the operational branches, i.e. Cata-

loguing, Public Services and Collections Development Branches. Staff in these branches must be trained to operate the new systems. Although the volume of data which must be processed at the National Library is just a small percentage of that handled by the Library of Congress or the British Library, the complexity of the computer programs which must be written is similar. It is in many ways almost as difficult to develop a system to process 1,000 bibliographic records as one to process 1,000,000 records. The necessity to develop systems to provide bilingual access to records also greatly complicates systems development.

Thus, in attempting to assign a priority and to schedule an automation project a great number of factors must be considered. When an existing manual system becomes inefficient due to increased data volume, it must be evaluated alone, and in conjunction with other smaller systems which need to be automated in the library, thereby facilitating a smooth integration with national and international data banks to which they must be able to furnish data in machine-readable form. The timing of an automation project is critical and involves such factors as the stage of development of other systems both inside and outside the Library to which it must interrelate, the evolution of standards which will be used in creating data for the project and the state of the technology required to develop the project.

The Automation Committee of the National Library which is composed of senior staff members from all branches and responsible for planning and advising on EDP activities, has recently undertaken a survey of all the services of the Library which should be scheduled for automation and, after a study of the factors relating to each, has prepared tentative schedule to 1980 based on our existing and forecasted resources. This schedule is, of course, subject to change according to the resources available for systems development and the impact of national and international developments. This schedule constitutes what we may call our master plan for automated systems development at the National Library.

The major projects are still those identified by the Systems Development Project report: Cataloguing including *Canadiana*, the Union Catalogue, the Union List of Serials, Acquisitions, and Serials Control. However, the development of national and international standards, changes in computer technology, and the availability of machine-readable bibliographic data from outside sources has had considerable effect on the design of these systems. A number of new services and changes in old services which have occurred since the Systems Development Project study five years ago have added to the areas which should

be automated. The following text will discuss three major systems which are now being developed: Cataloguing including *Canadiana*, MARC formats, and the Canadian National Bibliographic Data Base. An appendix to this article lists automation projects now identified with tentative operational dates in cases where this can now be determined.

III. Major Automation Projects

1. *Canadiana*/Cataloguing System

The system for cataloguing and for the national bibliography *Canadiana* is being designed so that it can handle records for *Canadiana* (Canadian library materials) and also for non-Canadian library materials received and catalogued by the National Library. The basis of the system is the creation of a master MARC record for each item catalogued. MARC records are necessarily very complex because they are designed to be "neutral" records which can be used to create bibliographic products for all library and information retrieval needs. They must observe national and international standards to make the exchange of bibliographic data in machine-readable form really viable.

From the master MARC records created by the *Canadiana*/Cataloguing System various products can be produced. Cards for inclusion in all the National Library catalogues, cards for the *Canadiana* Proof Service which are made available to libraries on a subscription basis, Canadiana MARC records on tapes, and camera-ready copy produced by the technique known as photocomposition are presently produced. The *Canadiana* data base can also be searched for special bibliographies.

Implementation of this system is tied to the development of MARC formats for various types of library materials such as monographs (books), serials, films, and phonorecords. To interface with the work of the Canadian MARC Office which must develop these formats, the system is being implemented in three phases: Phase I covers monographs and has been operational since the end of 1973; Phase II covers serials and government publications, both federal and provincial, and has been operational since the end of 1974; Phase III will cover audiovisual materials and is scheduled for operation in November 1977.

Some of the factors which have affected the development of the system are the emergence of international standards for cataloguing such as the International Standard Bibliographic Description (ISBD). This standard specifies punctuation and the order in which the various parts of a bibliographic record must be cited in national bibliographies and

other national cataloguing services. This aids users to identify the various elements of a record such as author, title, edition, publisher, even when they are not familiar with the language of the record. The ISBD for monographs was still subject to change when Phase I of *Canadiana* was being developed and this complicated the systems design because the systems specifications and computer programs had to be changed as the standard was officially changed. The ISBD for serials is not yet finalized and in the development of Phase II of *Canadiana*, we had to design a system which can handle two standards, the existing one and the evolving one which will replace it.

Phase II of *Canadiana*, which became operational late in 1974, has taken into account, in addition to the ISBD for serials, a number of factors involving developments and systems outside the National Library and thus partly outside of our control. Some of these are the International Serials Data System (ISDS) which has been set up in Paris by UNESCO as a world-wide serials data bank and to which the National Library must contribute machine-readable records for Canadian serials, and the CONSER project for Canadian-American cooperative development of a retrospective serials data base. Phase II also included the design of a MARC format and system for authority files to interface with bibliographic files. This authority system is now operational for name authorities especially for government bodies and it will eventually cover all other authorities including subject headings. In addition we had to study and take into account National Library in-house requirements for acquisitions, union catalogues, union lists of serials, etc., all of which will be fed by records from the *Canadiana* Cataloguing system.

The system has been a very complex one to design and implement. However, it is proving a good area in which to begin automation because it is a kind of microcosm of total National Library requirements for bibliographic data. The volume of data to be processed is relatively small, but it presents many of the problems which will have to be solved in the design of any national bibliographic system, such as the development of MARC formats for all types of library materials, the handling of bilingual data, the production of a number of library products such as cards, book catalogues and tapes, the creation and maintenance of a data base and the use of authority files. Thus, the implementation of this system has provided invaluable experience for all other National Library automation projects.

2. MARC formats

The idea of disseminating cataloguing data for library materials on magnetic tape in order to speed up processing and avoid duplication

of work was first realized by the Library of Congress with the development of the LC MARC format and the subsequent establishment of a MARC tape service. Great Britain followed suit with a MARC format for the British National Bibliography and MARC formats began to acquire international recognition. In 1971 the National Librarian appointed a MARC Task Group to study Canadian requirements for a MARC format, as it did not appear likely that we could simply adopt the American or British format because of our need to handle bilingual data. The report of the MARC Task Group which appeared in 1972, recommended a distinctive Canadian format which would follow the Library of Congress format as closely as possible since Canadian libraries follow North American Cataloguing standards and rely heavily on cataloguing copy from the Library of Congress. Certain elements from the British and French formats were recommended as well as a procedure to handle bilingual equivalents for major areas of the bibliographic record. A format for monographs and one for serials were outlined in the report.

In order to implement the recommendations of the Task Group, the Canadian MARC Office was established in the Research and Planning Branch in January 1973, headed by Edwin Buchinski who was a key member of the Task Group. In its first two years of operation the Office, now staffed by four people, has developed operational formats for monographs and serials, based closely on the recommendations of the Task Group. These formats are now being used in the production of *Canadiana* and in the Canadian MARC tape service. Basically the two formats are in line with the philosophy of the Task Group proposals. Some small technical changes in the format were necessary because the Task Group had worked from the theoretical point of view and some details were not feasible when applied to actual records. The development of MARC formats is tied to the development of the national bibliography, *Canadiana*, in its three phases: the monograph format was developed for Phase I; the serials format was developed in connection with Phase II which covers serials and government documents; audio-visual formats for films, phonorecords and other materials will be developed in connection with phase III. The formats are developed in close collaboration with the MARC Office of the Library of Congress, so although there are differences between the Canadian and American formats, there are by agreement no conflicts. Thus there will be no compatibility problem for libraries using records coded in either the Canadian or the American format.

In order to test the format developed by the Canadian MARC Office and to determine the best way of operating a Canadian MARC tape service, it was decided to make the first year of the tape service an experimental one. Few Canadian libraries as yet use MARC tapes from the Library of Congress and only one library uses the British MARC tapes; therefore there were not many libraries in a position to utilize Canadian MARC tapes. It was decided to select for the pilot project those libraries which already had some knowledge of MARC. Therefore libraries which had provided a member to the MARC Task Group or which were already subscribers to the Library of Congress MARC tapes were invited to become members of the Canadian MARC Tape Pilot Distribution Project. During the one-year pilot project period the eleven participant libraries received each week, free of charge, a Canadian MARC tape containing the items catalogued for *Canadiana*. In return the participants were asked to use the tapes in at least one application, for example, production of catalogue cards or current awareness lists, and provide feedback to the National Library on the use of the tapes. The Research and Planning Branch held a training session for participants at the beginning of the project in November 1973; two other meetings of the participants were held, one in the middle of the project on May 31, 1974, and one at the end of the project on March 17-18, 1975. At the end of the project, the reports of participants were studied in order to see if changes should be made in the format and in the tape service procedures.

Since January 1975, Canadian MARC tapes are made available on a weekly subscription basis. The subscription price for the first year of the service, commencing with *Canadiana* 1975 records, is $250 for Canadian subscribers and $300 for subscribers outside Canada.

The MARC format is very complex and it is becoming more and more evident that Canadian libraries need training on MARC and that the National Library should provide a consulting service on the use of MARC in the programs of individual libraries. This is essential in order to promote the use of MARC so that libraries can take advantage of the data which is available on the tapes and thus eliminate the need for each library to prepare cataloguing data for Canadian books. The Canadian MARC Office started providing consulting services to Canadian Libraries and setting up MARC seminars in order to assist libraries in using the tapes.

The work of the Canadian MARC Office has an international side as well as a national side. Several countries now have or are developing MARC or MARC-like formats. Unfortunately these all differ in many

respects in order to provide for national requirements, for example our own need to handle bilingual data. There are three aspects of the MARC format. First, there is the actual layout of the data on the magnetic tape, that is, the way in which the information is arranged so that a computer can locate the various parts of the record. There is general international agreement on this, enshrined in the standard for a bibliographic information interchange format for magnetic tape recording, standard ISO DIS 2709-1973 of the International Standards Office. The second aspect is the manner in which the information on the tapes is identified by numerical tags, which together with other codes and special characters make up what is known as content designators. A computer is not able to distinguish an author from a title, so each element must be tagged so that the computer can recognize it. Codes are also included for quick information retrieval searches by language, country of origin, date of the book, etc. The third aspect of the MARC format is the actual cataloguing information itself. The cataloguing rules used by libraries in different countries change the form of this information. This aspect will be the most difficult one as far as achieving international agreement is concerned. The cataloguing rules used are very much related to the language and cultural background of a country, for example, the way in which personal names of authors are cited varies.

It is hoped that eventually there will be an International MARC (sometimes referred to as SUPERMARC) format for international use. Each country may still have its own MARC format, but for international exchange among countries, the records would be changed into the International MARC format. The Canadian MARC Office works very closely with its opposite numbers in other countries to achieve as much conformity as possible in developing MARC formats and in proceeding towards an International MARC format. The Head of the Canadian MARC Office is a member of the Working Group on Content Designators of the International Federation of Library Associations (IFLA).

MARC formats are also being used for the International Serials Data System set up by UNESCO in Paris and in a Canadian and American project for the conversion to machine-readable form of bibliographic data on serials, the CONSER Project (CONversion of SERials). These projects all have special requirements and use formats which differ slightly from the Canadian format. It is the job of the Canadian MARC Office to work out compromises to enable the National Library to participate in these international projects using our Canadian MARC Tapes as input and in turn using the international tapes to feed National Library data bases. MARC formats are in an evolving state so that a reasonable compromise has to be sought between

constantly changing the format, or remaining so static that we cannot participate in international projects.

The National Library has now decided on a policy for the exchange of Canadian MARC tapes with other countries. Canadian MARC tapes will be provided free of charge to other national libraries in exchange for their own MARC tapes. The agreement with another national library or national bibliography centre will allow it to freely disseminate the information on Canadian tapes to other libraries in the country provided that the National Library of Canada is given in return the same privilege of distributing that country's records to Canadian libraries. This policy will mean that for the international exchange of MARC data, the National Library will only have to contact one national library or bibliographic agency in each country. This is in accordance with the international principle of Universal Bibliographic Control. Each country is responsible for producing full cataloguing records for its own publishing output; these are exchanged with other countries. Thus in principle, a book would only have to be fully catalogued once for the benefit of all libraries.

3. Canadian National Bibliographic Data Base

In the fall of 1972, the National Librarian established a Canadian Union Catalogue Task Group "to study and make recommendations on the nature, scope, maintenance and use of the Canadian Union Catalogue, which would form the bibliographic base of a national library network, with international interfaces". The Task Group has presented its first report and interim recommendations to the National Library and this Report together with a Statement on it by the National Librarian has been published as a special issue of the *National Library News*, January 1974.

The report basically recommends that the National Library of Canada should establish and coordinate a Canadian union catalogue system in cooperation with provincial or regional library systems. The national network would consist of a national centre at the National Library and a number of "regional" centres. The latter might be provincial centres, centres serving a number of provinces, or centres serving part of a Province. These "regional" centres would be tied to the national centre and would provide records of library holdings for a national interlibrary loan location system, as well as providing additional services for their regions such as cataloguing support services. The report also recommends that the National Library attempt to rationalize and coordinate the development of union lists at the national,

regional and provincial levels and develop, in conjunction with the National Science Library (now the Canada Institute for Scientific and Technical Information), systems for the production of union lists that could be used by the various levels of a national network to produce union lists for regional and local needs. It was also recommended that the National Library proceed with the production of a national union list of periodicals in the social sciences and the humanities as soon as possible.

In addition, the Task Group established a subgroup to study a system for the Canadian Union Catalogue. The subgroup recommended that the existing manual Canadian Union Catalogue on cards be closed and edited for publication, probably in microform. A new on-line automated system for the Union Catalogue should be developed. This new system could be partially decentralized by publishing a catalogue of holdings at intervals; libraries could also query the catalogue directly by communication lines.

These recommendations were accepted in substance by the National Librarian. It has now been decided that the existing Canadian Union Catalogue will be closed and edited for publication. Planning for the development of a new automated union catalogue system is progressing well. However, we will only close the existing card catalogue when the new system is fully operational, so that there will not be an awkward interim period to account for. A tentative date for the operation of the new system is 1977.

The automated union catalogue system which the Task Group recommends is a very complex system and one which will be costly to implement. Before undertaking the design of a system of this magnitude, we had to make sure that all requirements of the National Library, of regional centres and of Canadian libraries in general were taken into account. Therefore, before starting the design of the system we had to undertake a number of studies, some of which have already been completed.

One of the areas with which the Task Group was greatly concerned was the cost and speed of obtaining material on interlibrary loan. The high cost of processing interlibrary loans is placing a heavy burden on large research libraries who are net lender libraries. It is difficult for these libraries to obtain additional resources for processing interlibrary loans through their individual budgets because they cannot justify this as being of direct benefit to their own users. Thus, there is a growing demand by large research libraries for compensation to cover their expenses in providing material to other libraries. A number of comprehensive interlibrary loan studies have been done in the United States

where a fee system for inter-library loans appears to be emerging. This will add a large overhead accounting cost to the cost of interlibrary loans and will pass the cost on to smaller libraries which can least afford it or to individual researchers. If a similar system evolved in Canada, the inequalities in the availability of information which is already apparent owing to the geographical spread of the country would be greatly increased.

There are also problems in the logistics of interlibrary loan services, such as the procedures for locating, requesting, sending and returning materials, the communications methods used to locate and request items and delays in mail delivery. For these reasons, the Task Group, before making any recommendations on possible subsidization or other means of redistributing the interlibrary loan burden, recommended to the National Librarian that a comprehensive study be carried out on the methods, cooperative arrangements and costs of interlibrary loans in Canada, in order to obtain information relevant to the development of a national library information network. The University of British Columbia Library is doing this study under contract for the National Library. The University of British Columbia Library was in many ways an ideal library to carry out the study. It is itself a large net lender library and it is also in a good position geographically to understand the communication problems in transmissions of library materials in Canada. The final report of this study is expected early in April 1975.

Another study which has been done in preparation for the automation of the Canadian Union Catalogue is the Canadian National Bibliographic Data Base Study. This study, which was completed in March 1974, was conducted by Mr. R. M. Duchesne who was with the British Library at that time but is now on the staff of the National Library. The study covered the organization and content of a Canadian national data base of machine-readable bibliographic records and the means by which this data base would interface with other national and international data bases and tape services. The study was a technical one and is providing valuable information on which to base the design of the new system.

A study of the minimum bibliographic data elements which should be included in the new automated union catalogue was conducted and it has lead to the design and development of an accession reporting MARC communication format called Mini-MARC. The Mini-MARC formats for monographs and serials were developed to allow Canadian libraries to report to the Canadian Union Catalogue in machine-

readable form in the near future. These formats are subsets of the full Canadian MARC formats. Mini-MARC defines the minimum data elements and the minimum level of data definition (content designators) associated with the data elements which are required to post an accession to the Canadian Union Catalogue in machine-readable form. The development of the Mini-MARC formats is most significant, since it will permit Canadian institutions to mechanically convert a wide range of coding conventions and record structures to a record format that is both a national and international standard. Canadian libraries may employ a format range from the basic Mini-MARC essential level to full Canadian MARC. In order to post an accession to the Canadian Union Catalogue, the information should provide positive identification of a bibliographic item, and also be in a form suitable for publishing in microform cumulations or supplements. However, the reporting format should not be so detailed as to discourage libraries from reporting in machine-readable form. Therefore, Mini-MARC, although retaining the MARC structure, is designed at a level of detail which should be attainable by libraries using automated technical processing systems, as well as by those libraries employing MARC-like formats. Draft versions of the Mini-MARC format were circulated to the Canadian library community for comments, and a number of revisions were incorporated in the first edition which has been prepared for publication. Copies of the Mini-MARC formats will be available in both official languages by the middle of 1975.

A number of other studies are either completed or in progress. Some of these are highly technical and some are service oriented. We have completed a study of the access points to the Canadian Union Catalogue. The present card catalogue can only be searched by main entry, generally the author; the new automated catalogue will be searchable by multiple authors, titles, series, etc. The new catalogue will also be able to provide management information on the type of material being reported to the catalogue and thus on the type of material which Canadian libraries of various types are acquiring as well as on the type of material being located for interlibrary loan purposes. We are also studying the methods of closing off and editing for publication the existing card catalogue. It is possible to close the catalogue as of a certain date or according to the date of the books recorded in it. There are advantages and disadvantages both ways. The estimated 12 million cards present a formidable editing problem. We must determine the most cost-effective level of editing which will enable librarians to find items in the published catalogue with a relatively high degree of success

but which will not require an impossible number of man-years to achieve.

The development of an automated union catalogue system is closely related to the acquisition of computer hardware for the use of the National Library. So far all our systems have been running at a service bureau. A Treasury Board study of the use of electronic data processing in the federal government conducted recently recommended a number of computer centres to provide for the needs of all departments. One of the recommended centres was a Library and Information Retrieval Application Centre which would run computer programs for all federal government libraries and for other cultural departments having library-like information retrieval systems, for example, the Public Archives and the National Museums. The National Librarian was proposed as the custodian of such a centre. Preliminary planning and investigation was undertaken during the past year for the implementation of the Centre and it was decided to initiate an automated shared cataloguing system for federal government libraries as a pilot project to determine the feasibility and to form a basis of cooperative use of systems on which the future Centre could be built. Subject to Treasury Board approval, this shared system could be implemented in six months and become operational early in 1976. It is intended to run this pilot project at a service bureau. In fact, the present *Canadiana* Cataloguing System would be extended into a shared cataloguing system for federal government libraries. When cataloguing an item, participating libraries will be able to locate cataloguing copy from the data base of MARC bibliographic information from various national sources which will be merged with cataloguing data prepared by participants. This wealth of cataloguing information, searchable by computer programs, should enable member libraries to cut time and costs associated with original cataloguing. In addition to use of the data base, the shared cataloguing system will provide member libraries with catalogue cards, book catalogues and customized listings of holding.

In addition to having specific hardware available to the union catalogue system over an extended period, the system will require that some very specialized software be written for it. The National Library is developing a number of bibliographic files in machine-readable form. Many different National Library programs will use the same files, for example, Canadian MARC tapes can be used to produce catalogue cards, to add the National Library's own holdings to the Union Catalogue, and to conduct selective dissemination of information (SDI) searches. The National Library's total automated system needs a data

base management system to tie together all the files and make them available to individual programs, without having to duplicate the files each time they are needed. Related to the data base management system is an on-line automated authority file system. This system would enable us to use records from a number of libraries and countries by substituting the heading used according to National Library practice for those provided by the originating library. For example, an authority file system could replace a heading established according to the Prussian Cataloguing Rules in a record on German MARC tapes, with the heading in English or French established as required by the National Library according to the Anglo-American Cataloguing Rules. The authority file system is especially necessary to provide English or French data as required by specific Canadian libraries according to their needs. The development of the data base management system and the authority file system involves original research. Software requirements including those for a data base management system for the maintenance and use of an integrated on-line data base have been analyzed and the whole system is being built according to these requirements.

In planning for the automation of the Canadian Union Catalogue, we are working towards the development of a Canadian national bibliographic data base, which can provide not only a location service like the present card catalogue, but also other services using the same sophisticated on-line system.

The Canadian national bibliographic data base will be composed of data received from a number of sources via magnetic tape records in MARC formats. Tapes would be received from Canadian libraries and regional centres and from other countries and international centres. This data base could be used to assist individual libraries with their cataloguing, either by selecting on request machine-readable records and sending them to the libraries to process on their own computers, or by an on-line cataloguing support service. The National Library plans to examine the feasibility of extending the proposed cataloguing support service for federal government libraries to other Canadian libraries who might wish to use such a service on a cost basis. Such a cataloguing support service is based on a data base of machine-readable bibliographic records. User libraries are connected to the data base using a terminal, they adapt records found in it to their own individual needs and then have the central system produce the necessary products which they require, such as catalogue cards, book catalogues and book labels. If a library receives an item which is not in the data base, the library catalogues it and adds it to the data base for the use of all participants

in the cataloguing support service. Thus using national MARC records and other libraries' cataloguing as much as possible.

The data base system which we are developing and which will replace the existing Canadian Union Catalogue will be a data base covering monograph publications providing a union catalogue and catalogue-support system for books and serials. However, the National Library requires data bases for all other types of library materials: newspapers, audio-visual materials, material for the blind and physically handicapped, maps, etc. Individual MARC formats for handling records for these various types of materials are now being developed or will be developed but systems for creating and maintaining these data bases will be the same as for books and serials. The data base management system and the authority file system can tie several data bases together, so that they can be searched for all material by an author or on a specific subject regardless of its form. We are aiming at an integrated system, our plans are long-range and the system is gradually implemented for one type of material at the time.

The National Library will gain experience in using on-line cataloguing support services in its participation in the CONSER (CONversion of SERials) Project. This international project which developed as a result of a Serials Data Base Study conducted for the National Library under contract by York University is now firmly established. In December 1974, the Council on Library Resources (the Project Management) signed a contract with Ohio College Library Center (OCLC) to use the Center's computer facilities for the development of a serials data base in a file building mode. The goal is to create 200,000 machine-readable serials records in the two-year project. The National Library, a participant in this project, is now installing the terminal facilities needed to communicate with the Ohio College Library Center. The National Library sees the CONSER Project as the most feasible way of acquiring a national serials data base which will support the creation of union lists and other bibliographic services for serials needed by the Canadian library community. The National Library, as the Canadian centre for the International Serials Data System, also has an urgent need for a complete data base of Canadian serials which, when International Standard Serial Numbers (ISSN) and key titles have been added, can be used to furnish data to the international data base in Paris. The National Library has been named as a Centre of Responsibility to authenticate all access points for Canadian serial imprints, such as personal and corporate names, as well as for the assignment of International Standard Serial Numbers (ISSN) and key titles. The National Library will concentrate its contribution to the creation of the CONSER

data base on Canadian serials which will be fed into the project data base via the Canadian MARC tapes as well as by direct on-line input. Priority will be given to new Canadian serials, followed by current serials and then retrospective serials which have ceased publication. The serials records contributed will include government publications. The National Library will receive copies of the total CONSER data base at intervals from the Council on Library Resources and will make these records available to Canadian libraries as well as using them to create a national serials data bank and to form a basis for the production of union lists of serials in the social sciences and the humanities.

In addition to the Canadian MARC tapes already available in the Canadian MARC Tape Distribution Service, the National Library has started planning for the distribution of MARC records which are or will be received from other national libraries. The purpose of this MARC Records Distribution Service is to make foreign MARC records available to those Canadian libraries which want to use them in their cataloguing systems. As one of the first steps in the development of the Canadian national bibliographic data base, the retrospective MARC data base of the Library of Congress was acquired in order to start building the date base. It is also intended to acquire the retrospective MARC data base of the British Library. This MARC data base will be updated with the current tapes received from the Library of Congress and from other foreign national libraries. Canadian MARC records and records in Mini-MARC format received from Canadian libraries for the Canadian Union Catalogue will be added to the data base which will be searchable by ISBN, L.C. card and other national control numbers and author/title compression codes. Thus, bibliographic information issued by countries producing national MARC tapes will be available to Canadian libraries in machine-readable form through this MARC Records Distribution Service. It is expected that subscribers will have two basic options: they may (1) receive one tape each week containing the cumulation of all tapes received at the National Library during the previous week; or (2) select records from a complete file of MARC records in the Canadian national bibliographic data base. The benefits of this service are obvious. In the context of the Universal Bibliographic Control, the National Library will provide Canadian libraries with MARC records supplied by various countries. MARC records submitted to the Canadian Union Catalogue by Canadian libraries could also be available for distribution. This service should greatly reduce the original cataloguing done by individual libraries, cut processing costs and avoid duplication of work. Subject to Treasury Board approval, this service should be available in mid-1975.

In order to help Canadian libraries with library systems development, the National Library is developing a suite of computer programs referred to as the MINIMARC System. This automated cataloguing system, which is based on the MARC format, will enable libraries to process original cataloguing and to use MARC records from the MARC Records Distribution Service. The programs of this system are being written in such a way that they may be used on various computer systems with minimum effort. Users will be able to meet their specific data requirements by defining data in their own internal format, by defining input hardware and character sets, and by defining output formats through the use of tables. The suite of programs will support the use of the full range of Canadian formats from Mini-MARC to full MARC. Complete systems and users documentation will be distributed with the software. The MINIMARC System will be available in the fall of 1975.

In order to speed up the cataloguing process for Canadian books and make records available more quickly, the National Library is implementing a Canadian Cataloguing-in-Publication program on a decentralized and cooperative basis. The purpose of this program is to provide publishers who wish to participate in the program with cataloguing data which they can print in their books. Negotiations are now being conducted with several libraries which have shown an interest in a cooperative CIP program. The result of these negotiations is likely to be that these libraries will become agents for CIP in their regions. Agent libraries will receive galleys or page proofs and information sheets from publishers, and, after cataloguing, will send bibliographic records to publishers and to the National Library. The publishers will insert CIP data in their publications and the National Library will put CIP data on MARC tapes for distribution in Canada and abroad. When legal deposit copies of publications are received by the National Library, the cataloguing data will be updated and included in *Canadiana*.

IV. Conclusion

These new developments in automated systems at the National Library should optimize the use of available bibliographic data in machine-readable form by Canadian libraries. The concepts of co-operation among libraries and the development of networks for the exchange of services are not new. The tremendous increase in the number of works published over the last few decades, the limited resources of libraries and the shrinking of funds due to rampant inflation in our economic system, are bringing the ideas of co-operation and

exchange closer to realization. The advantages are attractive. First, there would be a substantial reduction in costs. An international exchange network of bibliographic data could, by using MARC records for example, reduce for each country the cost of locating and creating bibliographic records of foreign works. In addition, these co-operative systems and networks would enable libraries to avoid useless duplication of collections and technical operations, especially cataloguing.

In order to continue effectively to provide national bibliographic services to the Canadian library community and to function as the national bibliographic centre and central node of a Canadian national library network with international interfaces, the National Library must carry out an automation program of great size and complexity. Implementation priorities must be related to the development of national and international standards, systems and networks. Since the total program must be spread over a considerable time period, priorities will change as the need to participate in cooperative projects, to adopt new standards or to use or contribute to new data bases become urgent. Keeping automation plans constantly under review in the light of new developments and in the context of a total integrated information system for the National Library will assure that our limited system development resources are used most effectively to develop the automated systems most urgently required by the Canadian library community.

APPENDIX

A List of Major Systems Development Projects at the National Library

	Project	*Tentative Time Schedule* *Development Period*	*Operational Date*
1.	**Canadiana/Cataloguing System**		
	Phase I, monographs	1972-73	Nov. 1973 (operational)
	Phase II, serials and government publications	1973-74	Nov. 1974 (operational)
	Phase III, audio-visual materials (MARC formats and tapes distribution services are related to each phase)	1975-77	Nov. 1977
2.	**Authority File System**	1974-75	March 1975 (operational)
3.	**Cataloguing-in-Publication**	1974-75	Oct. 1975
4.	**Input of Canadian serials records to International Serials Data System, Paris**		
	Current serials	1974	1975
	Retrospective serials (related to CONSER Project)	1975	1975
5.	**Participation in the CONSER Project for building a cooperative serials data base**	1974-75	1975-77
6.	**Canadian National Bibliographic Data Base**		
	Mini-MARC format	1974	1975
	Data Base Management System	1975-76	1976
	Canadian Union Catalogue System (CANUC) (CANUC will cover first books and serials. Other types of materials (i.e. audio-visual materials, newspapers, materials for blind users) will be added after 1977)	1974-76	1977
7.	**Cataloguing Support System**		
	Provision of cataloguing records on magnetic tape to Canadian libraries (MARC Records Distribution Service)	1975	Sept. 1975
	Shared cataloguing system for federal government libraries	1975	Jan. 1976
	Provision of software for an automated cataloguing system (MINIMARC System) to Canadian libraries	1975	Dec. 1975
	Full cataloguing support (on-line)	1977-78	1978
8.	**Acquisitions System**	1977-78	1978
9.	**Serials Control System**	1978	1979
10.	**Surplus Exchange System**	1979	1980